Repair of a full thickness eyelid defect with a bilamellar full thickness autograft in a porcine model (Sus scrofa)

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Purpose

It has been demonstrated the tarsoconjunctival flap pedicle for full-thickness lid defects does not appear to supply the flap and the vascularization of the remaining eyelid/tear film is thought to offer adequate nourishment for survival of the flap. A swine model was constructed to assess the viability of a bilamellar autograft for repair of large full thickness lid defects.

Methods

Full-thickness defects of varying sizes were created in each lower eyelid of four Yorkshire/Yorkshire crossed swine. The defects were then closed with a full-thickness ipsilateral graft from the upper eyelid. Large full-thickness defects were then created in the upper and lower lids of eight Yorkshire/Yorkshire crossed swine and closed with bilamellar autografts from the contralateral lids. The subjects were monitored and assessed clinically for graft viability at days one, seven, and thirty. Necropsy was performed and histopathologic analysis utilized. All animals received humane care in compliance with the Policy for the Humane Care and Use of Laboratory Animals.

Results

Subject	Defect Size (mm)	Graft Size (mm)	Defect %	POD1	POW1	POM1
1R	10	7	36	1	1	1
1L	10	7	36	2	2	1
2R	11	8	39	2	2	1
2L	9	6	32	2	1	1
3R*	15	10	54	3	2	1
3L	15	10	54	2	1	1
4R	14	9	50	2	1	1
4L	14	9	50	2	1	1
5 RUL	15	15	54	2	1	1
5 LUL	15	15	54	2	1	1
5 RLL	15	15	54	2	1	1
5 LLL	15	15	54	2	1	1
6 RUL	16	16	57	2	1	1
6 LUL	16	16	57	2	1	1
6 RLL	16	16	57	2	1	1
6 LLL	16	16	57	2	1	1
7 RLL	20	20	71	2	1	1
7 LLL**	20	20	71	3	2	4
8 RUL	19	19	68	2	1	1
8 LUL	19	19	68	2	1	1
9 RLL	21	21	75	2	1	1
9 LLL	21	21	75	2	1	1
10 RUL	17	17	61	2	1	1
10 LUL	17	17	61	2	1	1
11 RUL	18	18	64	2	1	1
11 LUL	18	18	64	2	1	1
12 RLL***	22	22	79	2	1	N/A
12 LLL***	22	22	79	2	1	N/A

Table 1: Post-operative clinical assessment results.
*Subject 3 with wound dehiscence requiring repair on POD1
**Subject 7 with LLL post-operative hematoma w/ partial dehiscence and graft failure
*** Subject paralyzed intra-operatively, necropsy performed early at POW1

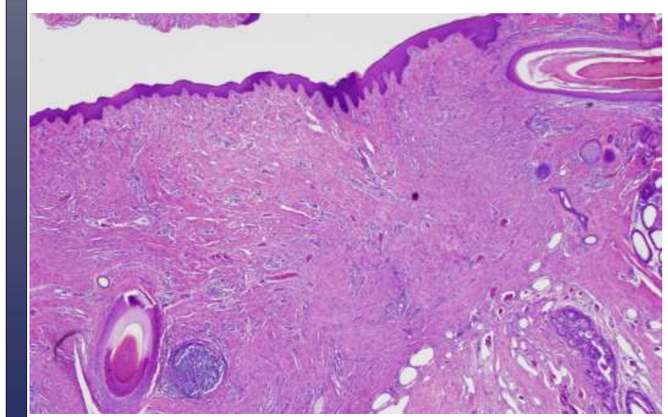

Figure 2: H&E stain; Lower right lid graft site of Subject 1. Appears healthy, viable graft, vascularized, no signs of necrosis with fibrosis at the graft-host interface.

Grade	Description
1	Pink and perfused
2	Pallor, perfused
3	Purple and dusky
4	Frank necrosis or eschar

Table 2: Clinical assessment tool

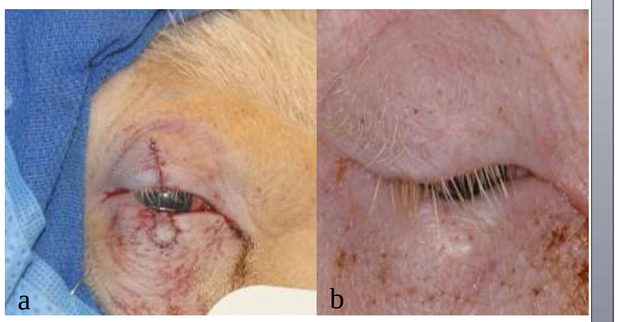

Figure 1: a) Subject 1, POD1 demonstrating graft viability without hematoma or dehiscence. b) Subject 1, POD30 demonstrating graft viability without clinically significant notching

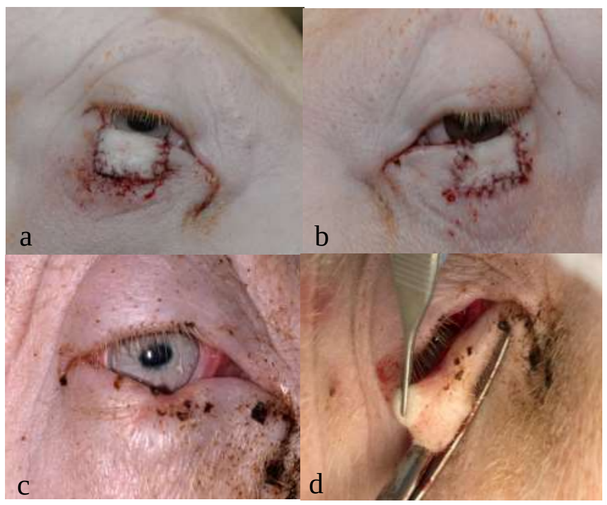

Figure 3: a) Subject 9, POD1 RLL demonstrating graft viability without hematoma or dehiscence. b) Subject 9, POD1 LLL demonstrating graft viability without hematoma or dehiscence. c) Subject 9, POD30 RLL demonstrating graft viability without clinically significant notching. d) Subject 9, POD30 RLL demonstrating graft viability without clinically significant notching. The subject was euthanized prior to the procedure.

Conclusion

At the conclusion of the monitoring period, twenty-seven of the grafts were deemed clinically viable and vascular ingrowth was determined to be equivalent to unaffected eyelid sections by histopathologic analysis. This analysis demonstrates the viability of a full-thickness bilamellar autograft as a surgical alternative in the repair of large full-thickness eyelid defects in a porcine model. For further information regarding the study please reference the full abstract in the ASOPRS Fall Meeting Syllabus.

References

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The experiments reported herein were conducted according to the principles set forth in the National Institute of Health Publication No. 80-23, Guide for the Care and Use of Laboratory Animals and the Animal Welfare Act of 1966, as amended